

***Density estimates & relative indices: the current  
status of macropod populations on Maria Island  
National Park***



Photo: Simon Brain 2009

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A thesis submitted in partial fulfilment of the requirement for the degree of  
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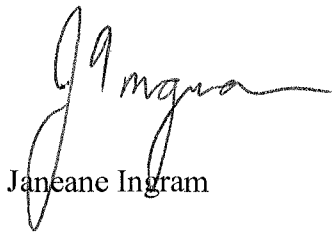
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## ***Declaration***

This thesis contains no material which has been accepted for a degree or diploma by the University of Tasmania or any other institution, except by way of background information and duly acknowledged in the thesis. The model details and script for the R program from Chapter 4 were designed and written by Dr Simon Wotherspoon, School of Maths and Physics, University of Tasmania and are included in the thesis as an appendix. To the best of my knowledge and belief, this thesis contains no other material previously published or written by another person except where due acknowledgement is made in the text of the thesis.



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Date

## **Abstract**

On Maria Island National Park (NP) Forester Kangaroo (*Macropus giganteus*), Bennett's Wallaby (*Macropus rufogriseus rufogriseus*) and Tasmanian Pademelon (*Thylogale billardierii*) were introduced due to a past management strategy. This policy has caused problems from overgrazing on the island due to seasonal increases in pasture levels, with resulting impacts on animal welfare. The effect of rainfall on population dynamics and resource availability is well documented, with macropods particularly affected due to rapid reproduction rates.

Typically, lethal control methods have been used to control population abundance. Public awareness of animal welfare issues arising from control methods such as culling, has forced wildlife managers to re-evaluate their use. On Maria Island NP annual spotlight surveys have been conducted to estimate a population index for each species. Population estimates are then used to determine if a reduction cull is required, together with body condition of individual animals and pasture availability.

Wildlife managers require reliable population estimates to make informed decisions. This study aims to improve our understanding of population monitoring by comparing spotlight surveys as population indices, with current line transect survey density estimates. In addition, historical cull, spotlight and rainfall data were combined into a model to predict future culling impacts. The model offers a unique opportunity to establish a management tool for use on any monitored macropod population that is harvested or culled annually.

Monitoring indicated that line transect methods are effective for Forester Kangaroo and Bennett's Wallaby, with an improved survey design. Tasmanian Pademelon had the least probability of detection, but the highest encounter rate and population index from spotlight counts. Predictions from the growth model indicate culling annually with a moderate target level was the most efficient management scenario. Management intervention based on models using time series data and rainfall may prove to be the most important tool for population control of macropods in Australia.

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